

4 Managing Computer-Based Information Systems

1. Action and nonaction
2. Recurring and nonrecurring
3. Documentary and nondocumentary
4. Internal and external
5. Historical and future

It is possible with this classification to divide all business information into 32 categories which can be useful in analysis of the information requirements of a business. For example, they may be used in the following generalizations about business information:

1. Action, recurring, documentary, internal, historical information is the prime candidate for automation. In fact, this classification of information will form the "data base" for most automated information systems.
2. The timing and accuracy of action information is usually important.
3. Precise timing usually is not a factor in the reporting of nonaction information.
4. Nonaction information is a prime candidate for elimination.
5. Nondocumentary information is just about impossible to control.
6. The higher the management decisions, the more important become external information and future projections.

BUSINESS INFORMATION SYSTEMS

In order to handle effectively the information that is entering, circulating, being generated and leaving a business, it is necessary to organize logical systems for handling data. There are three major information systems in a typical company, and a varying and indefinite number of minor systems. A major system is one that affects the entire structure of an organization. A minor system is one that is confined to a single functional part of an organization. (This is not to imply that it has *minor* importance; it is minor only in the sense that it applies only to a limited part of the company.) Let us look at the major systems first.

Major Information Systems

Logistics Information. The logistics system is concerned with information about the physical flow of goods through an organization. It covers procurement, production and distribution. It includes such activities as inventory control, production planning and control, scheduling, and distribution.

There can be several separate logistics systems in any one company. Where separate product lines are manufactured in separate facilities, each product line could have a more or less independent logistics information system.

MANAGING COMPUTER-BASED INFORMATION SYSTEMS

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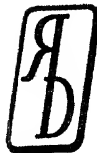
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Case material of the Harvard Graduate School of Business Administration is made possible by the cooperation of business firms who may wish to remain anonymous by having names, quantities, and other identifying details disguised while basic relationships are maintained. Cases are prepared as the basis for class discussion rather than to illustrate either effective or ineffective handling of administrative situations.

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PREFACE

THIS BOOK is intended to provide students of business management with an understanding of how computer-based management information systems are constructed and of the management opportunities and problems associated with this activity.

It is assumed that the student has a prior knowledge of the technical aspects of data processing, and the book concentrates on developing his ability to make effective use of it as a manager. The book is intended for use in a semester course in which it is assumed that students have had a previous introductory course in computers. It may also be used as part of a full-year course on data processing where other material is used to introduce the students to the more technical aspects of EDP.

In selecting material for this book we were guided by the following criteria:

1. Inclusion of material relevant to the manager or student of management only.
2. Presentation, in a structured fashion, of material suitable for instruction on the total range of issues involved in the construction of a formal management information system.
3. Placement of heavy but not exclusive emphasis on information systems in which a computer played a significant role.

All of the cases in this book have been used at the Harvard Business School. Many have also been used at other institutions. These cases have been selected because of their interest and their educational value as basis for class discussion. They are not intended to present illustrations of either ineffective or effective handling of administrative problems. Except as specifically indicated, all cases in this book were developed for use in courses at the Harvard Graduate School of Business Administration and are copyrighted by the President and Fellows of Harvard College. Nearly all the cases are "field"—that is, based on actual field research within the companies involved. Only those companies who have permitted their companies to appear in undisguised form can be publicly thanked here. These are State Consumer Reporting Bureau, New England Gas and Electric, Chicago Police Department, Rand-Whitney Corporation, St. Louis Police Department, and McDonnell Douglas Corporation. We are, however, very grateful for the cooperation of those firms which

prefer to remain anonymous. We are also grateful to the *Harvard Business Review*, *Journal of Management Science*, and *Business Horizons* for permission to include articles which originally appeared in these publications and to the authors of these articles.

The material in this book is the outgrowth of experience in developing and teaching a course entitled "Management Information Systems" at Harvard Business School. Consequently we are indebted to Dean George Baker and Associate Dean George Lombard for providing us the time and opportunity to develop the course. Professor Walter Frese and Dr. Ronald L. McFarlan provided many valuable suggestions and much encouragement during the development of this material. Michael Scott-Morton, Albert Dexter, Simon Zysman, Jack Baumler, and D. J. Rogers, during their periods of appointment as research assistants and research associates at the Harvard Graduate School of Business Administration, also provided much valuable assistance. Professors Thomas Raymond, Francis J. Aguilar, and Scott M. Cunningham have also contributed to this book. Two cases have come from members of other institutions: Professor Chauncy Beagle of the University of Colorado and Dean Glenn D. Overman of Arizona State University. Each has permitted us to use a case developed by him. One case was developed under the auspices of the Sterling Institute, and we are grateful for their permission to include it. We are deeply indebted to many of our colleagues here at the Harvard Graduate School of Business Administration for the encouragement and advice they provided during the writing of this book. Finally, we would like to express our appreciation to Miss Marion Sears for the fine job she did on editing some of the manuscript, and to Miss Hannah Segal and Miss Sandra Jeffries for typing portions of it.

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chapter 1

INTRODUCTION TO INFORMATION SYSTEMS

THIS PAPER discusses the nature and characteristics of business information and the systems for gathering and organizing it.

BUSINESS INFORMATION

Webster gives the following definition of information: "knowledge communicated by others or obtained from investigation, study, or instruction."

Pattern of Information in the Typical Business

Using this definition, what are the sources of information received by the typical business? One important channel of information is the mail. Each day hundreds or even thousands of items of information come into a business via the United States Post Office. Much of this information is routine—such as orders for products, invoices for material purchased, confirmation of goods shipped, bills of lading, or checks in payment of accounts. Some of the information entering a business through the mails is less routine—for example, letters of complaint, requests for job interviews, or requests for information about former employees.

Information also enters a business through other channels of communication such as the telephone, telegraph, and teletype. On a less formal basis, businesses are visited every day by people from outside of the firm, who frequently bring written or oral information with them. Or conversely, executives and employees visit other companies and pick up pieces of information. Other sources of information are printed documents, papers, magazines, and books.

Within the company, information is generated and transmitted. Letters, telegrams, and telephone calls from the field inform executives about the status of the sales efforts or the amount of goods shipped to customers. Information on production, inventory levels, and costs are transmitted from the factory to interested parties. The accounting department distributes financial statements, budget reports, and standard cost variance reports. Executives develop plans and policies and transmit these to the affected parties.

Just as information is received daily, all companies transmit information daily. For example, they place orders, hire personnel, pay bills, or answer customer complaints. In short, a great deal of time is spent in all businesses either receiving or transmitting information. Most of management's time is directly or indirectly involved with information.

If a business is to operate effectively, it must develop some means for handling all of this information efficiently and effectively. Yet, since the information received, generated, transmitted, and published throughout an organization can have very different characteristics, there must be different systems for handling the different kinds of information.

Classification of Business Information

Business information is not homogeneous. Different kinds of information must be treated differently. Consequently, we have found it useful to divide information into several different classifications. These classifications have been helpful in understanding many of the aspects of information systems.

Action versus Nonaction Information. One dichotomy of information is action and nonaction information. Action information requires that the recipient take some action; for example, orders received from customers. The initial recipient of this information must transmit it through the system until the order is filled.

Action information can be of several kinds depending upon the urgency of the need for action. One kind of information is that which will always require immediate action, such as the receipt of an order. Another type of information always requires future action, for example, a bill to be paid in 10 days. Handling this type of information requires a filing system that will assure that action is initiated at the proper time. Another kind of action information requires possible but not definite action; for example, when a manufacturing manager receives an overhead budget report, he may decide either to take action immediately or to wait for another month and then take action if cost performance has not improved. He also may decide that no action is necessary at all.

Nonaction information also can be divided into several kinds. Perhaps the most important type is that which indicates some action has already taken place; notification that a bill has been paid, a shipment made, or

a payroll met are examples. Another common type of nonaction information is that which will eventually become part of an action report. Most accounting information in the process of being accumulated falls into this category. A third kind of nonaction information includes that received from periodicals and books.

Recurring versus Nonrecurring Information. Another dichotomy of information is recurring and nonrecurring. Most information may recur occasionally over a long enough period of time. For purposes of this classification, however, recurring information is that which is generated at regular intervals at least once a year. Recurring information includes almost all accounting, production, inventory, and sales reports. The most important kind of nonrecurring information is that included in studies made to assist management in strategic planning, such as the building of a plant or expansion of a product line.

Documentary versus Nondocumentary Information. A third dichotomy of information is documentary and nondocumentary, or oral information. Documentary information is that which is expressed in writing or which has been converted into some kind of permanent form, e.g., punched cards, punched paper tapes, or magnetic tapes. Nondocumentary information is information that is transmitted through word of mouth or that has been received from personal observation and is not preserved in some written form.

Internal versus External Information. A fourth dichotomy is information generated internally and that generated from external sources. Accounting statements, budget reports, product schedules, and payrolls are examples of internally generated information. External information can also be of several types. One kind concerns the status of an order placed with an outside firm. Another kind is data assembled by an industrial service group and sent to participating members. A third kind is the product plans of a competitor. Clearly, internal information usually is much easier to obtain than external. Also, much desirable external information is never available.

Historical Information versus Future Projection. A fifth dichotomy is historical information and future projections. Most forward management decisions are based on projections, and historical information is useful principally as a basis for these projections.

The most important difference among future projections is their degree of reliability. For example, a study of expected cost savings from the acquisition of a new machine is likely to have significantly more reliability than profit projections from the introduction of a new product line. These differences in reliability are practically never stated explicitly, and consequently it is up to the user of the information to decide upon its reliability.

Analysis of Business Information. To summarize, we have five important dichotomies of business information: